Intel® AGP Stress Agent

A Windows* based AGP stress tool

Intel® AGP Stress Agent 1.0
Intel Corporation

OPSD Software Tools and Technology Homepage:
http://www-opsd.intel.com/swtt

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Chapter 1: Introduction to the Intel® AGP Stress Agent

The purpose of Intel® AGP Stress Agent is to maximize the data bandwidth over the AGP bus in a real world operating system environment using OpenGL* and DirectX* 7.0 APIs. This application takes advantage of the 3D graphics processing-pipeline by eliminating superfluous geometry and rendering stages to reduce overhead and maximize data transactions between the system and the AGP adapter. Essentially, the goal is to eliminate all extraneous bottlenecks from the system except for on the AGP bus.

This documentation is written for a general technical audience, one that is comfortable with computer terminology and operating applications within the Microsoft* Windows* environment. Although occasionally a higher level of technical detail has been included (i.e. Chapter 6), it is not necessary to understand these sections to run the Intel® AGP Stress Agent properly.

1.1: What is AGP?

The Accelerated Graphics Port (AGP) was developed to provide bandwidth improvements between the graphics accelerator and system memory. This allowed graphics vendors to reduce component and manufacturing costs by limiting the amount of local graphics memory on their boards. Graphics vendors could essentially treat system memory (RDRAM*, SDRAM, etc) as an extension of local video board memory for some high volume memory operations, like storing textures or large polygons.

AGP was designed on top of the 66 MHz PCI specification with numerous significant enhancements intended to optimize AGP for high performance 3D graphics applications. To begin with, AGP provides a dedicated connection to the memory controller. Conversely, a graphics adapter on the PCI bus has to share ownership of the bus with other PCI devices. Secondly, the AGP bus is clocked at 66 MHz, twice as fast as the typical PCI bus. In addition, data transfers are not regulated by the AGP clock but by a high-speed strobe that can run 1x, 2x, or 4x times faster than the 66 MHz clock. This allows maximum real data throughput to be in excess of 500 MB/s in 2x mode and up to 1 GB/s in 4x mode according to Intel's published AGP specifications.

Maximum Theoretical Throughput

- AGP 1x: 4 Bytes * 66.6 MHz ≈ 252 Megabytes/Second
- AGP 2x: 4 Bytes * 133.3 MHz ≈ 508 Megabytes/Second
- AGP 4x: 4 Bytes * 266.6 MHz ≈ 1017 Megabytes/Second

1.2: Current AGP Testing Procedure

The quality control testing currently done on AGP systems consists of playing computationally expensive 3D games or using an auxiliary device called the HAVC2*, which stresses the bus using hardware. Although 3D games do provide a real world environment for testing, they often lack the necessary data bandwidth needed to saturate the AGP bus. These games are often written for the lowest common hardware denominator and, therefore, the polygon count is rigorously optimized and reduced to run smoothly on legacy graphics adapters. In addition, games spend a great deal of

processing power on operations like artificial intelligence, collision detection, physics calculations, and system resource management that are irrelevant to the AGP bus. This additional overhead inhibits the system from fully utilizing AGP. Even if these supplementary operations did not exist, games provide no means to log errors or provide statistical information that are needed for regression testing.

A completely different approach to stressing the AGP bus uses the HAVC2 test hardware. The HAVC2 fits in the AGP adapter slot and, from the bus's perspective, functions like an ordinary AGP device. Although HAVC2 works extremely well for testing AGP functionality, the fact that it requires specialized hardware and does not provide a real world environment for testing makes it less than ideal for testing consumer systems.

1.3: System Requirements

It is necessary to run the Intel® AGP Stress Agent with a graphics card capable of sustaining at least 15 million triangles/second to stress the AGP 2x bus and 30 million triangles/second to stress the AGP 4x bus.

Minimum System Requirements

Processor:	Intel® Pentium® III 400 MHz (OpenGL*) and 1.0 GHz (Direct3D*)
Motherboard:	AGP supported chipset
Memory:	64 MB of PC800 RDRAM* or DDR-SDRAM
Graphics:	GeForce2*; or AGP capable card with on-board Transform & Lighting
OS:	Windows* 98, Windows 98SE, Windows ME, Windows 2000
DirectX:	DirectX* 7.0, DirectX 7.0a, DirectX 8.0 (or above)

Recommended System

Processor:	Intel® Pentium® III 400 MHz (OpenGL*) and Pentium® 4 1.4 GHz (Direct3d)
Motherboard:	AGP supported chipset
Memory:	128 MB of PC800 RDRAM or DDR-SDRAM
Graphics:	GeForce*2 *ULTRA* (i.e. 3D Labs Annihilator*2 *Ultra*, Hercules Prophet* II *Ultra)*
OS:	Windows 2000
DirectX:	DirectX 7.0, DirectX 7.0a, DirectX 8.0 (or above)

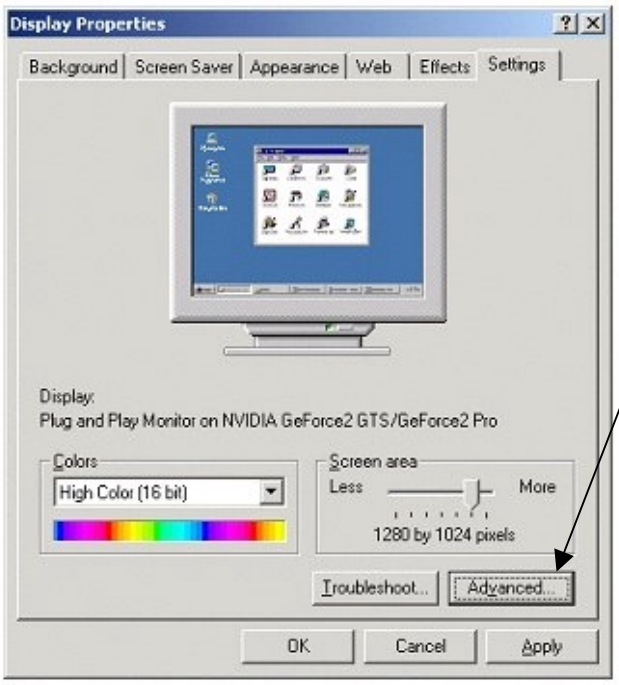
1.4: Recommended System Settings

Resolution
The operating system resolution should be set to at least 800x600.

Bit Depth
The color depth should be set to 16-bit (high) color.

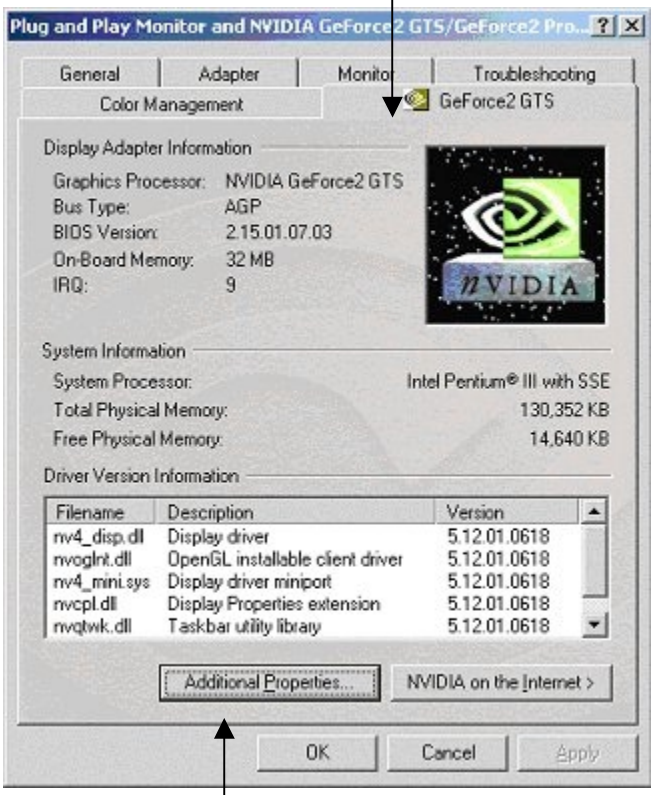
Vertical Synchronization
Vertical Synchronization, or V-Sync, describes the synchronization between the video card and the monitor. When V-Sync is on the graphics card will draw a new frame to the screen every time the monitor refreshes. In other words, if the monitor refresh rate is set to 60 Hz, the video card will be limited to 60 frames/second. To avoid this bottleneck, V-Sync should be set to off.

Disabling V-Sync on NVIDIA* (GeForce, GeForce2, GeForce2 Ultra) Cards

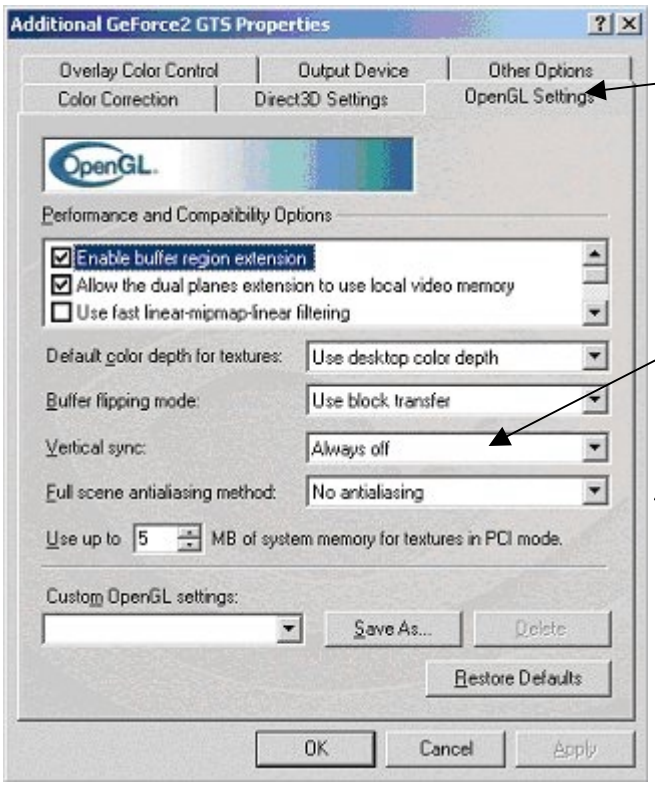


Step 1: Display Properties
In the Display Properties control panel, click on the *Advanced* button

Step 2: Video Card Tab
Switch to your video card's tab (in this case it's the GeForce2).



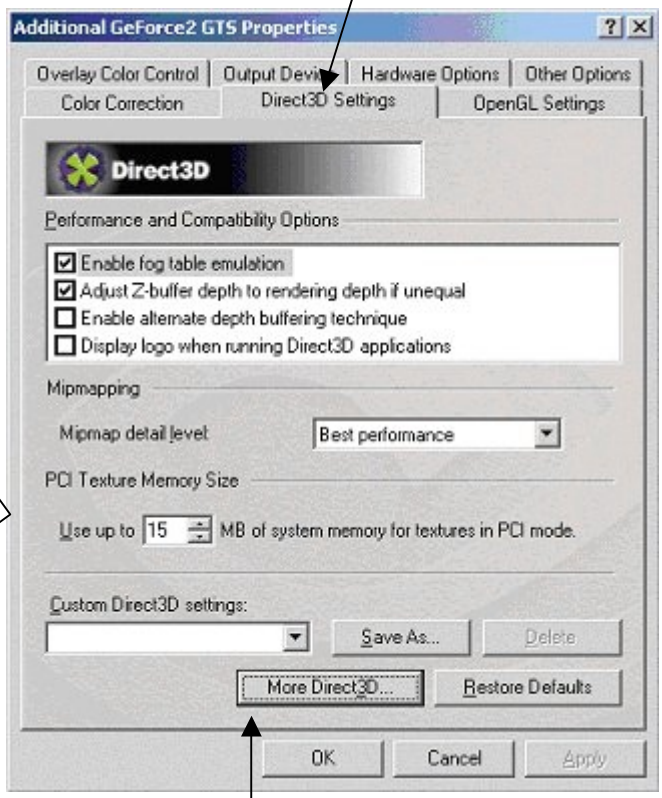
Step 3: Additional Properties
Click on the *Additional Properties* Button



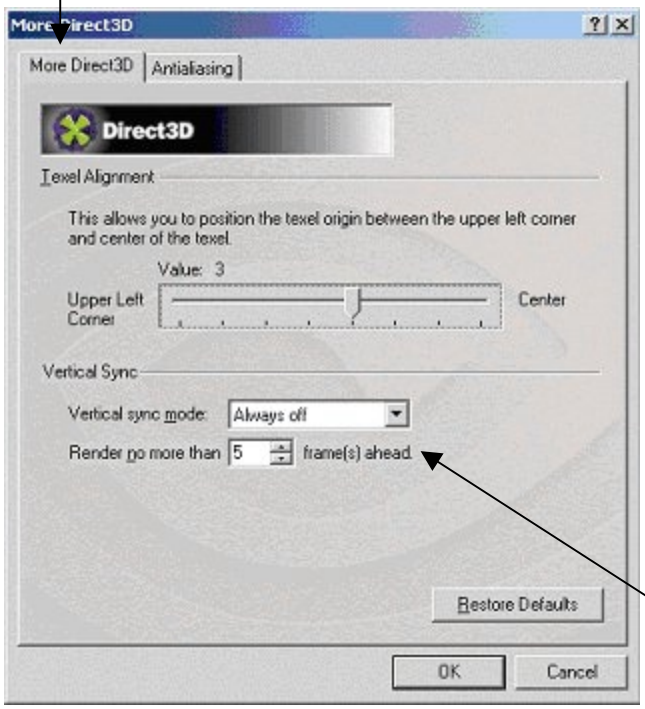
Step 4: OpenGL Tab
Switch to the OpenGL Settings tab

Step 5: OpenGL V-Sync
Turn OpenGL Vertical Sync to *Always off* and click OK

Step 6: Direct3D Tab
Switch to the Direct3D Settings tab



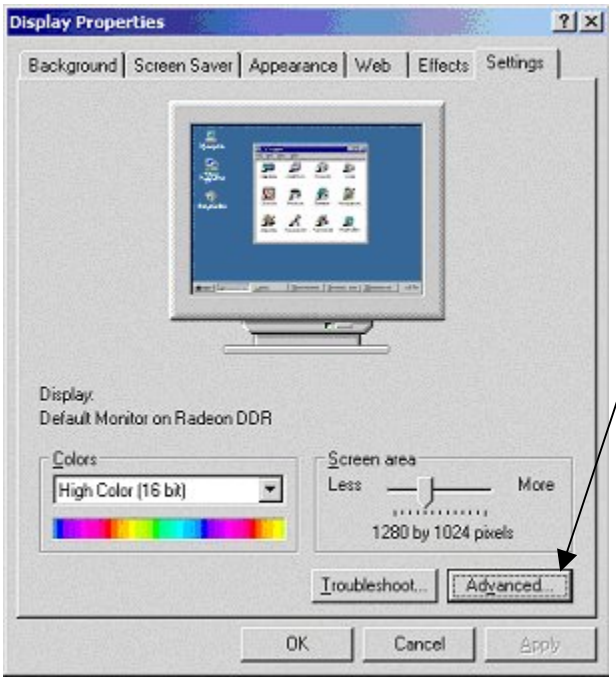
Step 8: More Direct3D
Switch to the *More Direct3D* tab



Step 7: More Direct3D
Click on the *More Direct3D* button

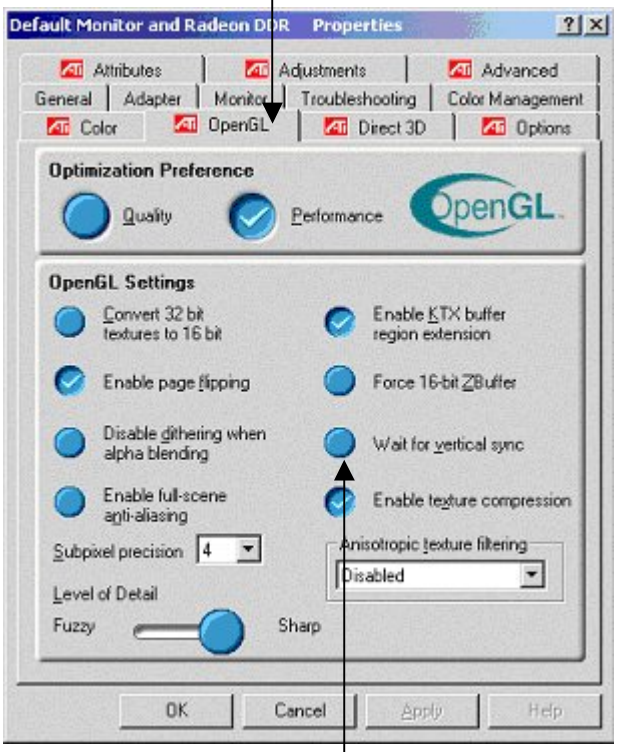
Step 9: D3D V-Sync
Set the Direct3D V-Sync mode to *Always Off*

Disabling V-Sync on a ATI Radeon* Video Card



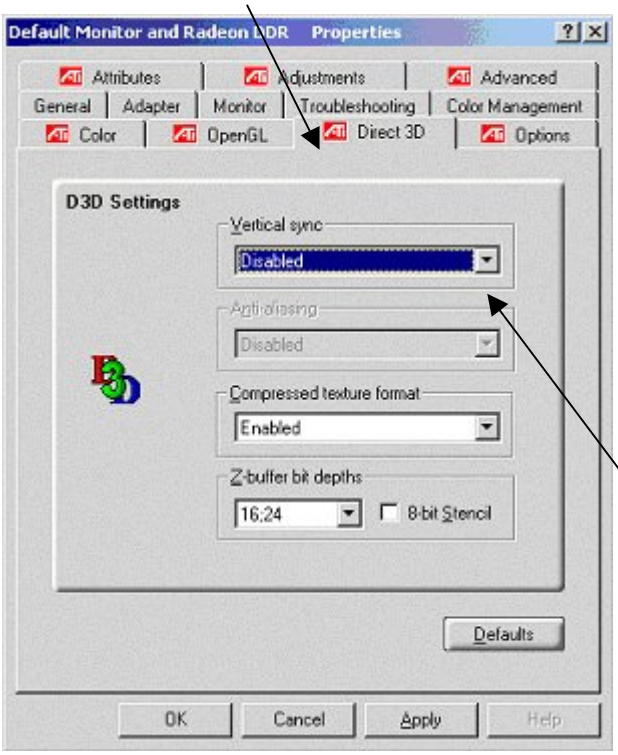
Step 1: Display Properties
In the Display Properties control panel, click on the *Advanced* button

Step 2: OpenGL Tab
Switch to the OpenGL tab and make sure that Wait for vertical sync is *not* selected



Step 3: Wait for vertical sync
Deselect *Wait for vertical sync* so that the button is beveled out.

Step 4: Direct3D Tab
Switch to the Direct3D Tab



Step 5: D3D Vertical Sync
Select *Disabled* for vertical sync in Direct3D

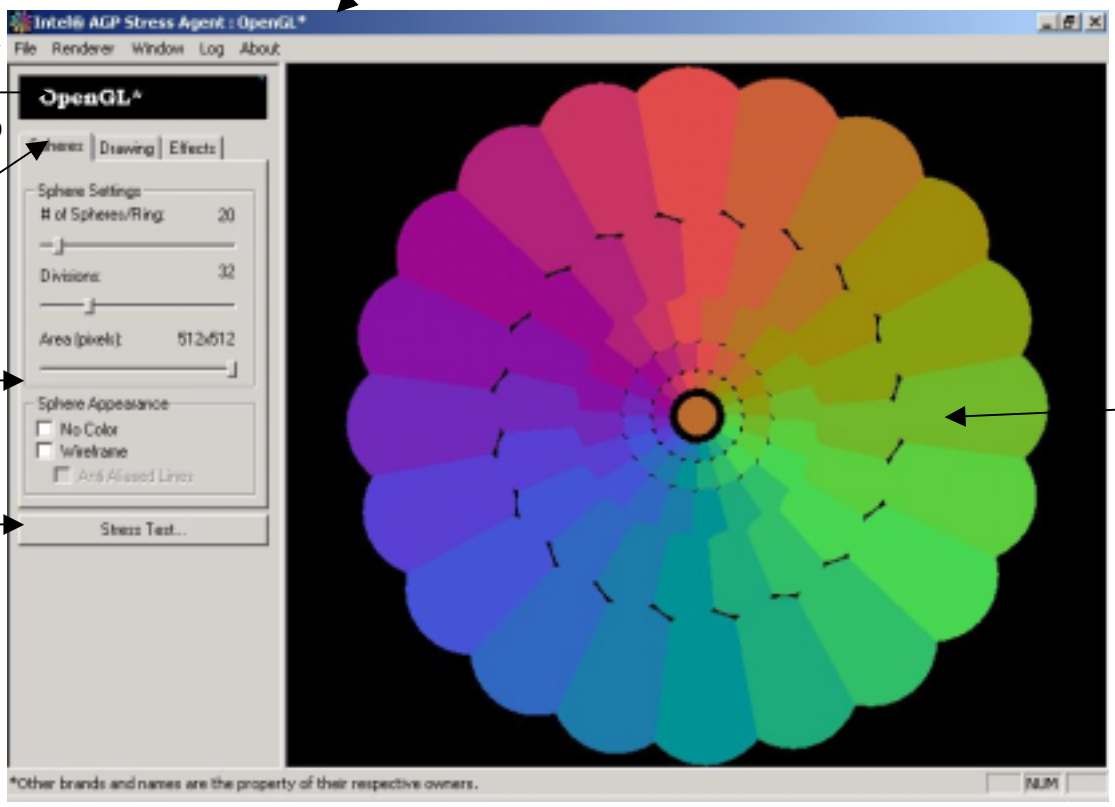
Chapter 2: Example Operation Without Textures

This chapter will walk through an example highlighting the normal operation of the Intel® AGP Stress Agent without textures, from start to finish.

2.1: Executing the Application

Upon executing the Intel® AGP Stress Agent application, a window much like the one below will be displayed. Note that if the system requirements are not followed, this window may not display properly or an error dialog might warn you that your hardware is insufficient.

The first thing we must decide after loading the AGP Stress Agent is which API rendering to use. In this example, we will stick with OpenGL API, but the operation is the same for OpenGL API and Direct3D API. To switch to Direct3D API, simply click the OpenGL text.

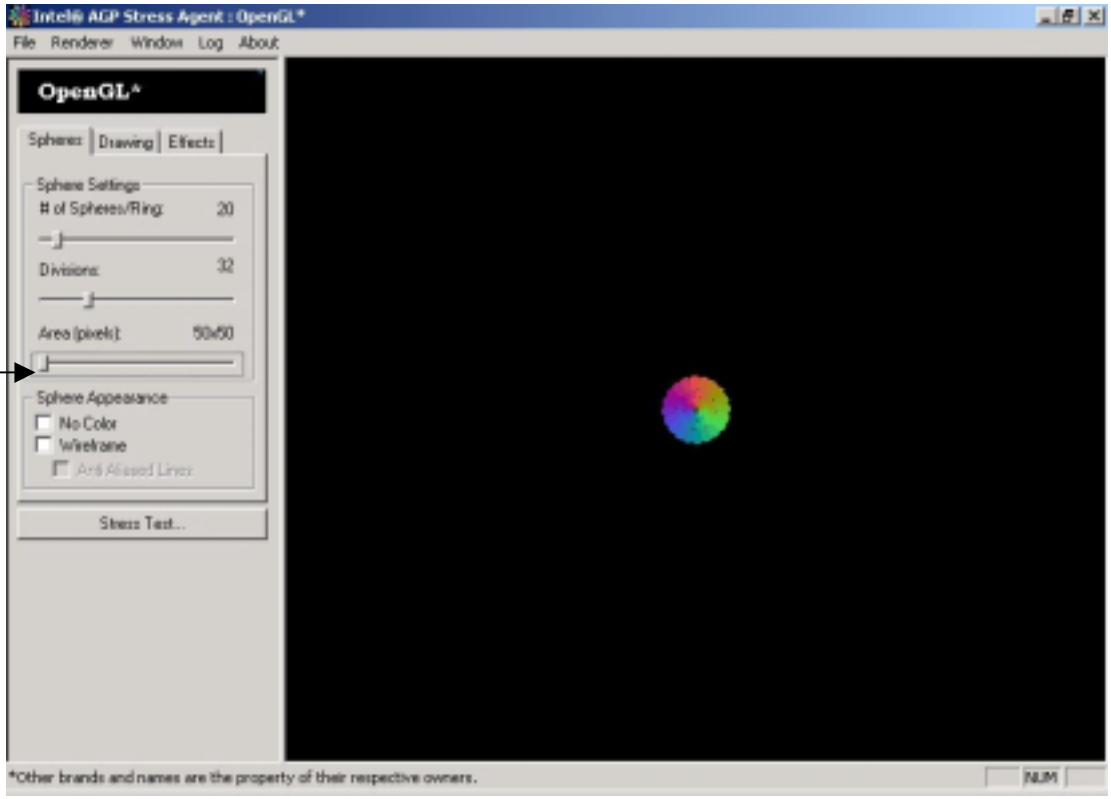


When the Intel® AGP Stress Agent program loads, the command tabs (shown above) are always reset to their recommended values. The only setting that must be updated is the drawing area (shown in the command window above as *Area (pixels)*). Let's do that now.

2.2: Reduce the Drawing Area

Note that the drawing area was set to 50x50 (from 421x421). It is important that the drawing area be reduced to diminish the effect of the video card's fill rate (see Section 6.X).

Reduce the drawing area

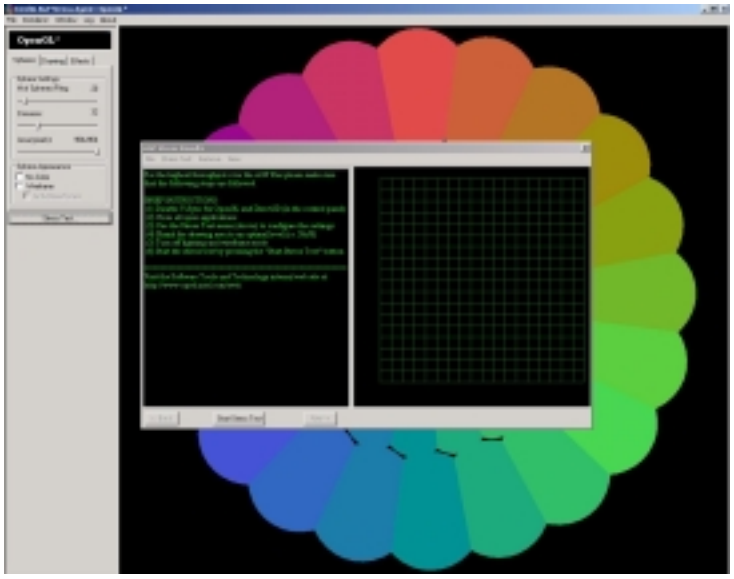


The next step is to open the Stress Test Window. We can do that by either clicking the button labeled *Stress Test…*or by clicking *Window->Open Stress Test Window*.

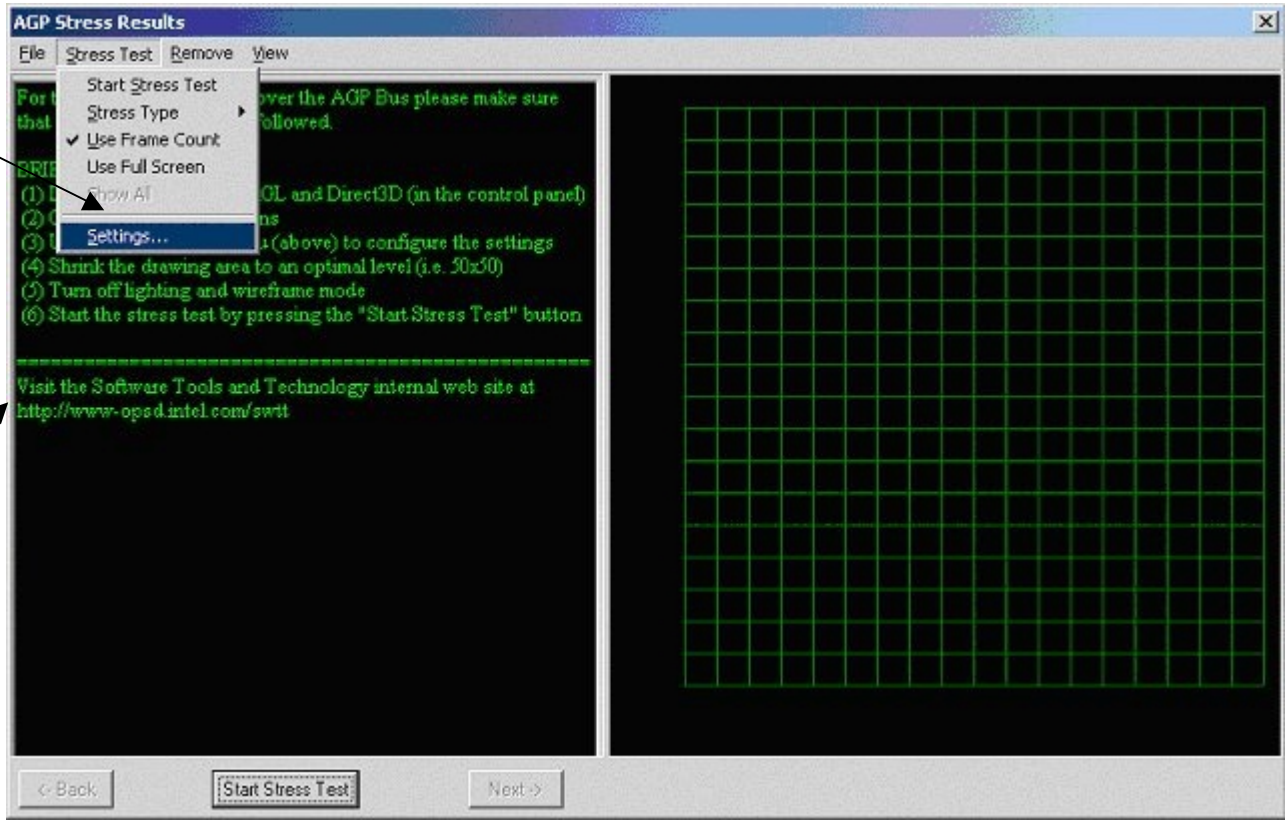
2.3: Stress Test Window

When the *AGP Stress Test Window* is first opened, a brief list of instructions is displayed in the left windowpane (see below). It is recommended that these steps be followed for the maximum utilization of the AGP bus. The right windowpane displays an empty graph.

To get a better look at this window, refer to the next page.



Use the *Stress Test* menu to select *Settings*

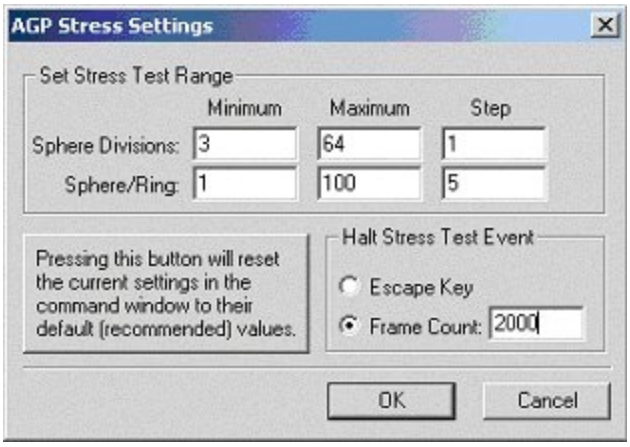


Brief stress test instructions

The above picture offers a better look at the AGP *Stress Test Window*. Use the *Stress Test* menu in this window to select and open the *Settings…* dialog.

2.4: Stress Test Settings Dialog

The *AGP Stress Settings* dialog allows you to set a few parameters that affect how the stress tests are executed. In this example, we will run a *Sphere Numbers* stress test from one sphere to 100 (incrementing by five). The *Sphere Numbers* test allows you to set a defined range of spheres to test. The *Sphere Divisions* test allows you to set defined range of divisions to test.

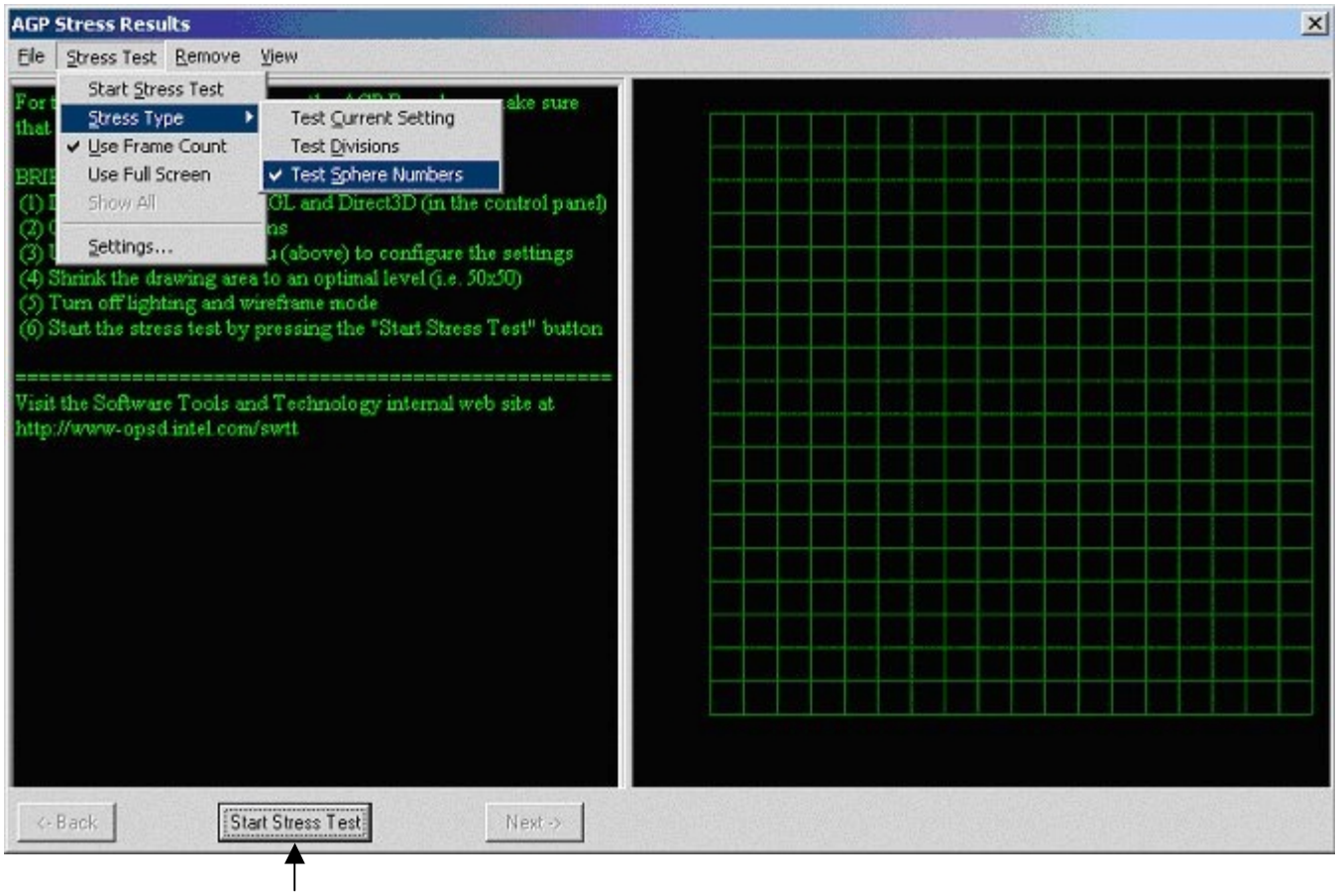


Also, be sure to set the *Halt Stress Test Event* to *Frame Count*. In this example, we will test each *Sphere Number* step 2000 frames.

Click OK to save these new settings. Now we are almost ready to run a stress test.

2.5: Running a Stress Test

Now that we have set our rendering area to 50x50 and defined a stress test range in our *Stress Test Settings* dialog, we are practically ready to run a stress test. As was mentioned in Section 2.4 above, we are going to run a *Sphere Numbers* stress test. In order to do this, we need to select the *Stress Type* in the *Stress Test* menu (see below). In this case, we select the *Test Sphere Numbers* menu item.



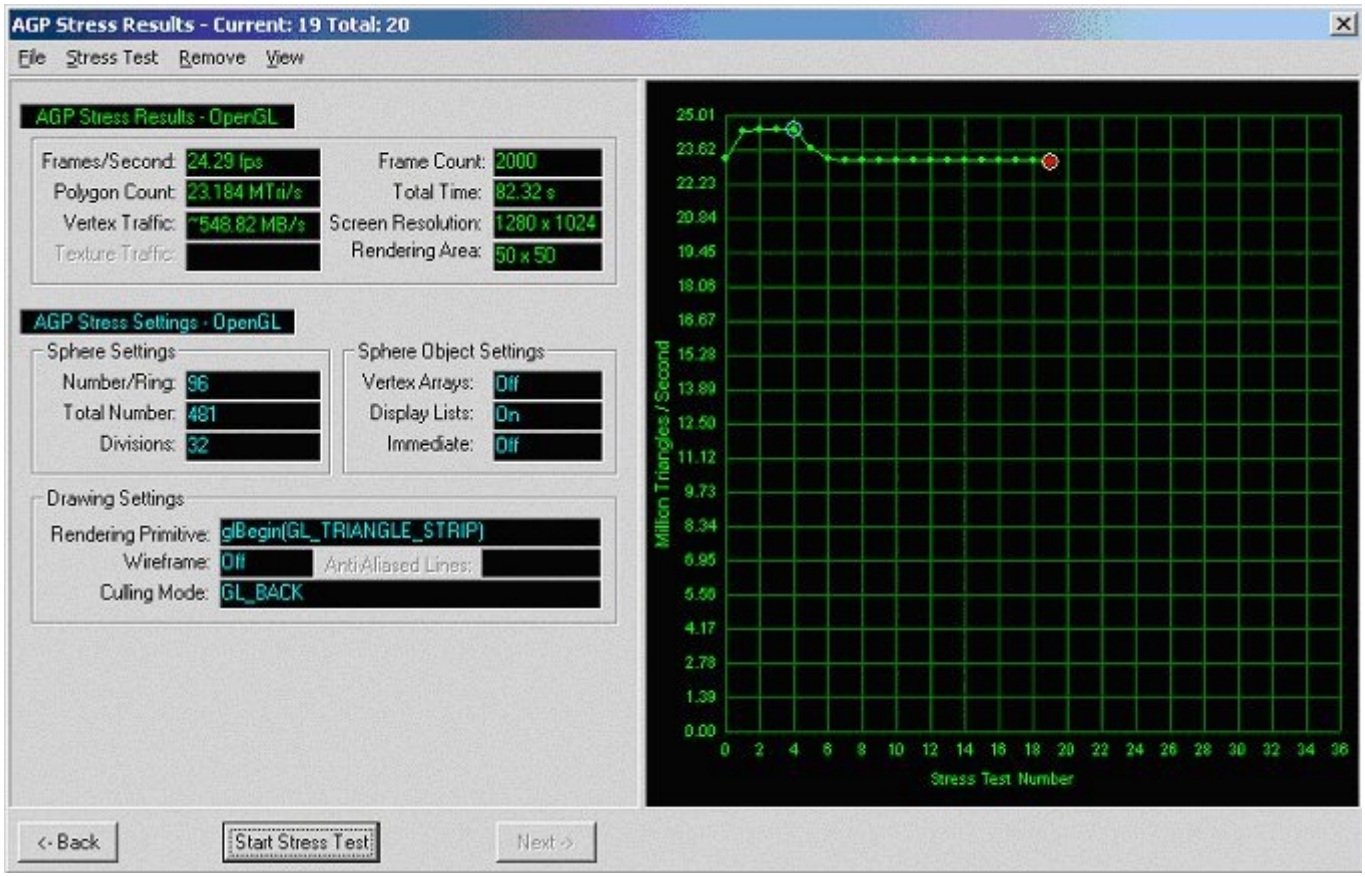
Click here to begin the stress test

After we select our *Stress Type*, we are ready to run the stress test. Click the *Start Stress Test* button or select the *Start Stress Test* menu item to begin the stress test. During the stress test all mouse and keyboard inputs are disabled with one exception: the *Escape* key. If, for whatever reason, the stress test needs to be stopped prematurely, just press the escape key and the results window will display the results of the tests that were completed.

If we let the stress test run its course, it should test 1,6,11…91,96 spheres; each at 2000 frames. Once the test is finished, the *Stress Test Window* will pop-up with the results.

2.6: Stress Test Results

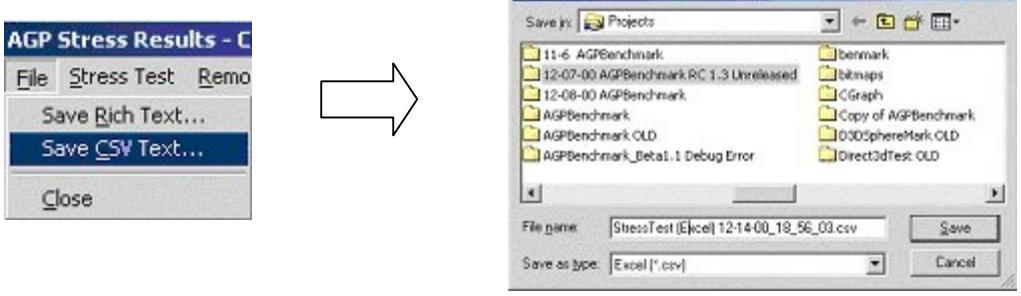
The *Stress Test Window*, now rich with results from our stress test, displays a graph of the polygon rate data in the right windowpane. To view the results of each intermediate test, use the *<-Back* or *Next->* buttons on the bottom of the window or left-click the green dots on the graph. For more information on the results display, see Section 6.1.



Once we are finished stress testing, we can save the results in a Rich Text Format (rtf) or in a Comma Separated Value (CSV) format. In this example, we will save our results in a CSV format.

2.7: Saving the Results

To save our results in a CSV format, click *File->Save CSV Text…* The *Save Dialog* will then prompt you to save the file. This file can then be opened with Microsoft* Excel* or an equivalent spreadsheet program.



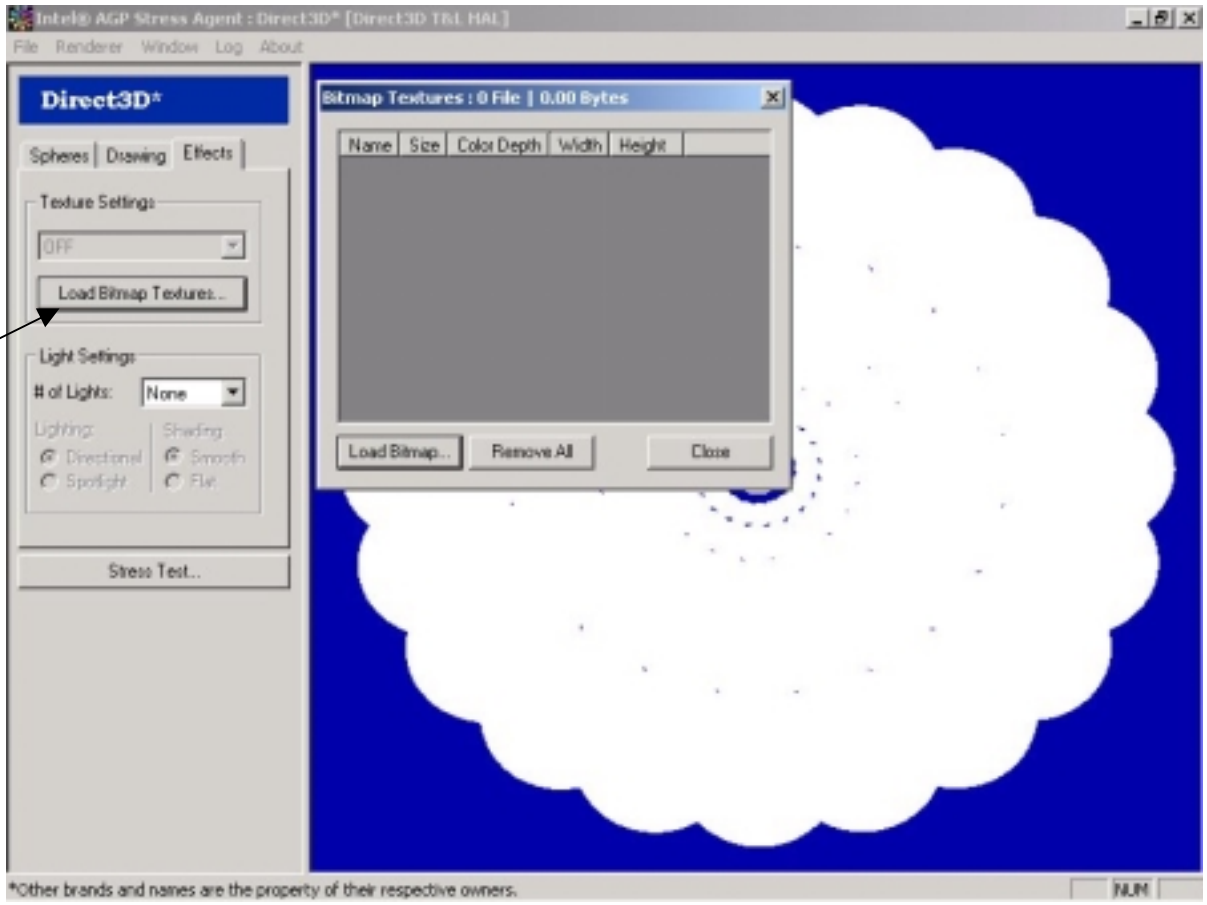
Chapter 3: Example Operation With Textures

This chapter will walk through an example highlighting the normal operation of AGP Stress Agent with textures, from start to finish. Because Chapter 2 "Example Operation Without Textures" was done in OpenGL, this chapter will be done in Direct3D.

3.1: Opening the Bitmap Texture Window

Open the *Bitmap Texture* window by selecting the *Effects* tab in the command window and pressing the *Load Bitmap Textures…* button. This will open the *Bitmap Textures* dialog window (shown below). It should be noted that testing has shown enabling texturing increases the delta between AGP 2x and 4x.

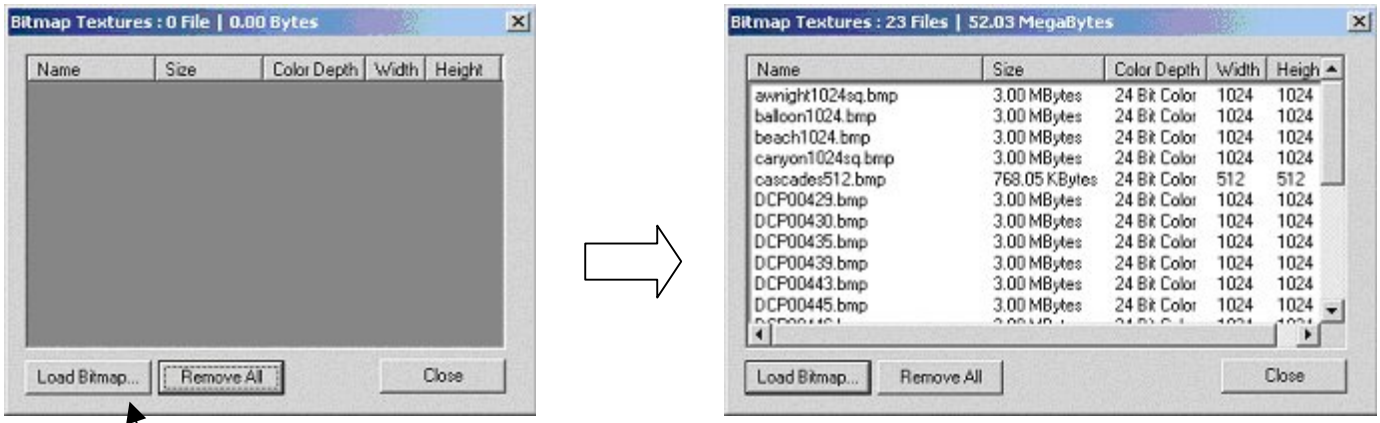
Press this button to open the *Bitmap Textures* dialog



3.2: Loading the Bitmaps

Click the *Load Bitmap…*button to display a *Open File* dialog. AGP Stress Agent uses 24-bit bitmaps; 8-bit or monochrome bitmaps will not load. Additionally, bitmaps that are 2^n x 2^m (i.e. 32x64, 256x256, 1024x512) work the best. It should be noted that the video drivers attempt to store textures locally on the video card. To prevent this, make sure that the amount of bitmaps loaded in Megabytes surpasses the amount of local memory on your video card. In this example, I have 32 Megabytes of DDR SDRAM so I load 52.03 Megabytes of bitmap textures.

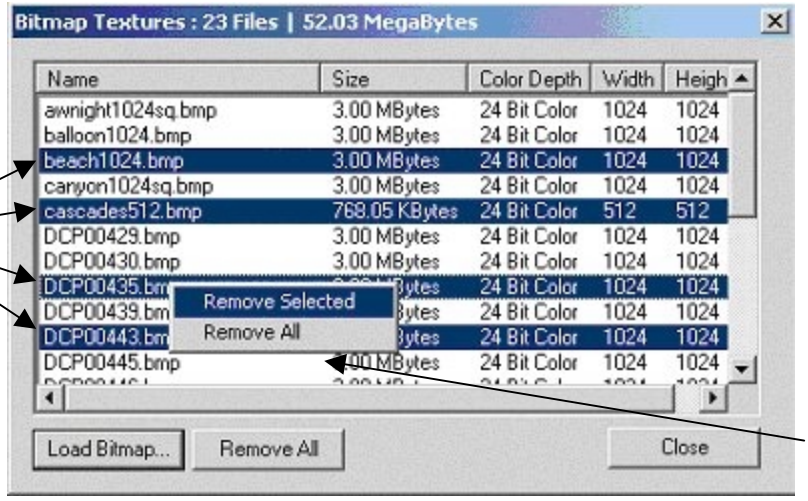
If there are no compatible bitmaps on your system, you can download a ZIP package of bitmaps at our website: http://www-opsd.intel.com/swtt in the Downloads section (select Graphics as the Technology and All as the Environment, then click submit).



Click here to open the bitmaps on your hard drive.

Also note that bitmaps can be removed by right clicking in the *Bitmap Textures* list control, or by pressing the *Remove All…* button. To select more than one bitmap to delete, press and hold the control key while left clicking on multiple files (see below).

Press and hold the ctrl key while left clicking on files to select them.

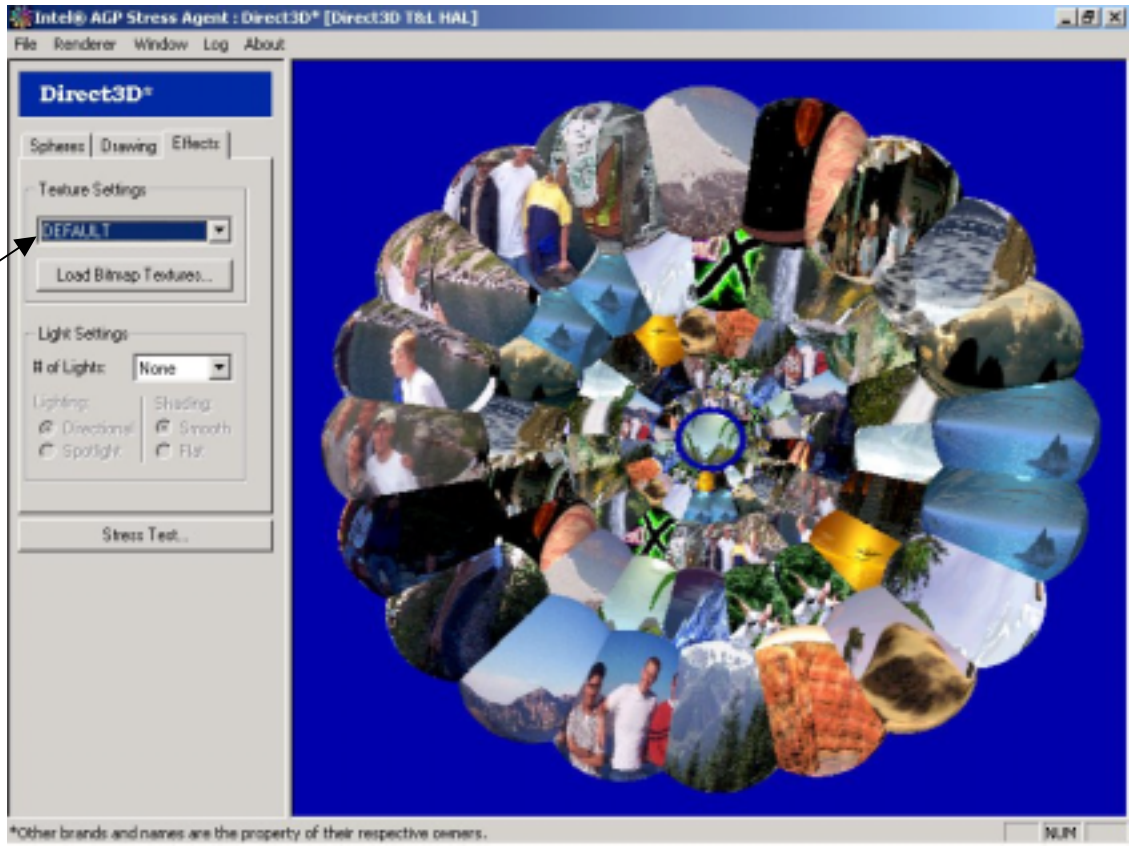


Right click to bring up this pop-up menu.

3.3: Turn on the Textures

Once the bitmaps have been loaded, we need to turn on texturing. To do this, go to the *Effects* command tab and select *Default* under *Texture Settings*.

Select *Default* in this listbox to turn on texturing.



3.4: Stress Testing with Textures

Basically, from the user's perspective, stress testing with texturing enabled is done in the exact same manner as with texturing disabled. So, we can conclude this section here. Refer to Section 2.2 through 2.7 for information on how to run a stress test.

Chapter 4: AGP Stress Agent Commands and Settings

4.1: The Main Menu

The main menu, shown below, is made up of five items: *File*, *Renderer*, *Window*, *Log*, and *About*.

File Menu: Exiting the Application

The *File* menu has only one sub-item: *Exit*.

Renderer Menu: Switching To Direct3D*/OpenGL*

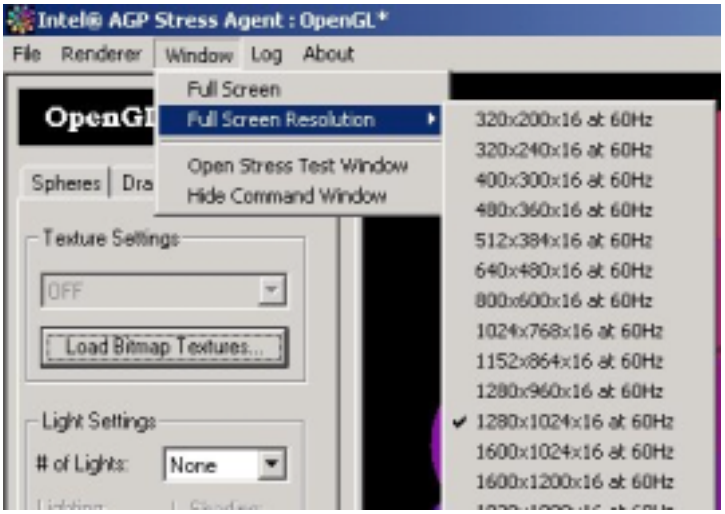
Intel® AGP Stress Agent dynamically builds the *Renderer* menu during the initialization process; therefore, the figure below may look slightly different from system to system. The user can switch from OpenGL API to Direct3D API and vice versa using this menu. The user can also switch renderers by clicking on the OpenGL/Direct3D picture. Note: it is suggested to always use Direct3D T&L HAL whenever possible when operating in Direct3D mode.

Switch to OpenGL/Direct3D by using the menu or clicking the OpenGL/Direct3D logos

Window Menu: Setting Full Screen Resolutions

The *Window* menu allows the user to set the full screen resolution of the application. This menu is dynamically built according to the supported display modes by the current renderer. Although each resolution is programmatically tested before being appended to the menu, certain monitors may not support the highest resolutions.

During stress testing it is possible, but not necessary, to run in full screen mode. The recommended full screen resolution is 640x480 in OpenGL and Direct3D.



Log Menu: Setting the Log Mode

The *Log* menu allows the user to set the *Log Properties*. For more information on the log settings and capabilities please refer to Section 3.0.

During stress testing the log should be set to *Off* so that logging does not impede AGP stress performance.

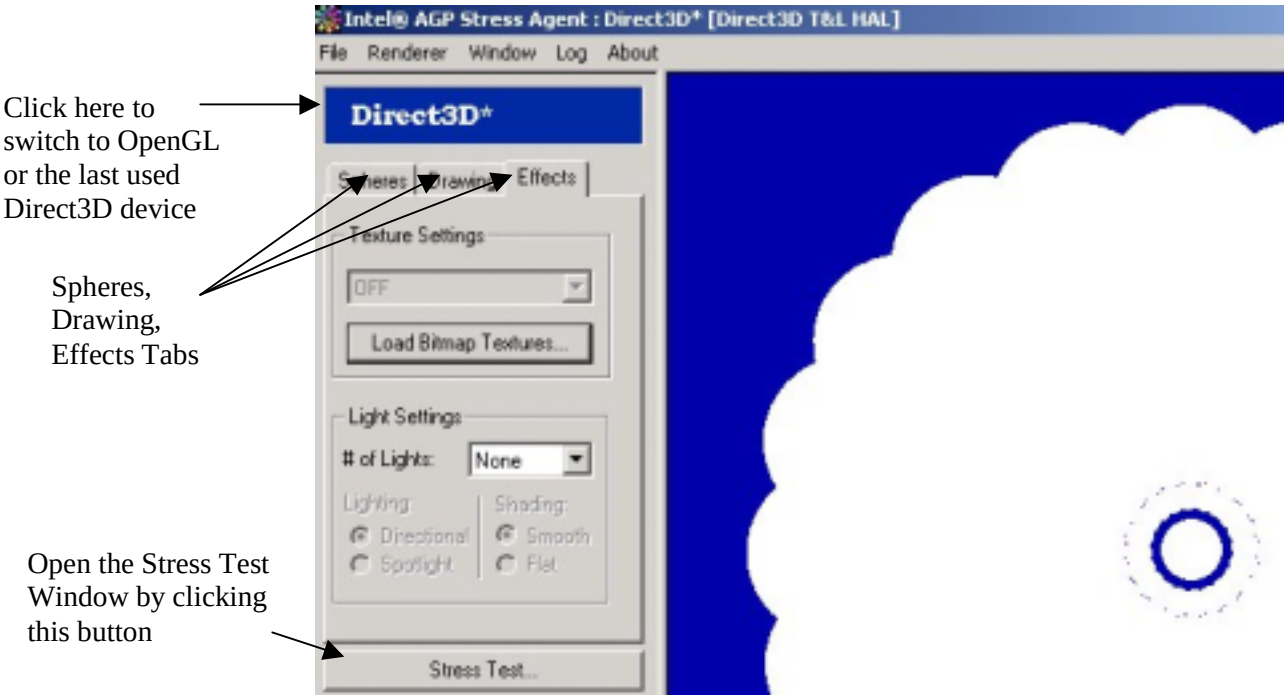
About Menu: Viewing Information About the Program

The *About* menu provides a means to view information about OpenGL, Direct3D, and the tool itself.

4.2: The Command Window

The *Command Window's* principal function, as its name would suggest, is to accept commands from the user. The *Command Window* is located on the left side of the application and contains a tab control that divides commands into three sub-groups: *Spheres*, *Drawing*, and *Effects*.

1. *Spheres* Tab: contains commands relevant to sphere appearance and structure
2. *Drawing* Tab: pertains to how the spheres are stored and rendered in memory
3. *Effects* Tab: controls texture and lighting settings

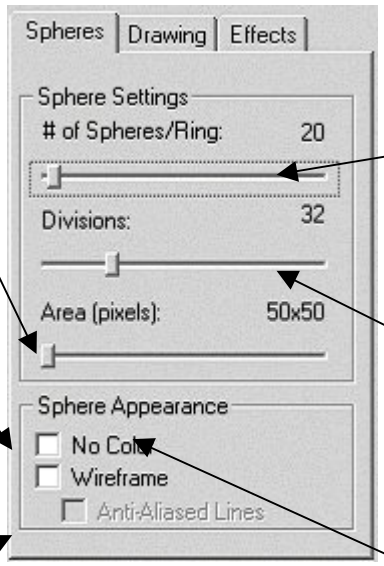


4.3: Spheres Settings Tab

Set the Rendering Area
This setting resizes the rendering area, which reduces the fill rate bottleneck on the video card. During stress testing, this value should never be *above* 100x100.

Toggles Wireframe Mode
Turns wireframe mode on and off. This setting should be turned off during AGP stress testing.

Toggles Anti-Aliasing
This setting is only applicable when wireframe mode is on. This setting should be off during AGP stress testing.



Set the # of Spheres/Ring.
The rendering window contains five sphere rings, each ring is made of the same number of spheres (20 in this case). Although dependent on the # of divisions set per sphere, this setting should never be less than 20 during stress testing.

Set the # of Divisions
Each sphere is made up of a set number of horizontal and vertical lines (32 in this case). This setting has a dramatic effect on AGP stress testing, and should not be, in most cases, set to lower than 30 divisions.

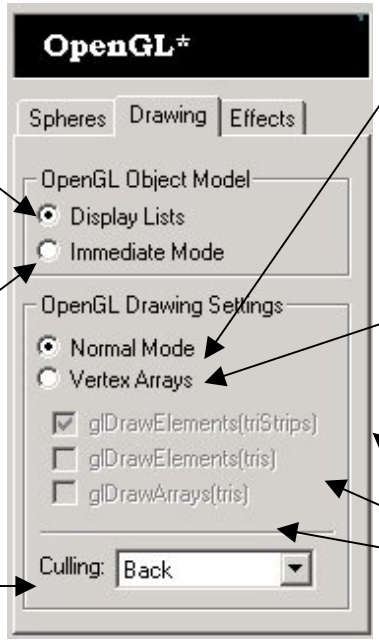
Toggles Color Mode
Turns the color on and off. This setting has no effect on AGP stress testing.

4.4: Drawing Tab – OpenGL

Display Lists
This setting allows OpenGL commands to be stored in a display list. The contents of a display list are preprocessed and therefore should execute more efficiently than the same set of commands in Immediate Mode. See section 4.0 on System Processor Dependencies.

Immediate Mode
Executes OpenGL commands the moment they are called, rather than from a display list. See section 4.0 on System Processor Dependencies.

Culling Mode
Based on "eye direction" culling is used to eliminate vertices that fall under the combo box criteria. For instance, in "Back" mode all vertices that are calculated to be hidden behind other vertexes are eliminated



Normal Mode
The default drawing mode. Each vertex of the sphere is specified directly between *glBegin* and *glEnd* blocks. The primitives used in this mode are defined in section 3.5 (Table 3.0)

Vertex Array Mode
Instead of calling an OpenGL procedure to pass each individual vertex, normal, or texture coordinate, separate arrays of vertices, normals, and texture coordinates are pre-specified, and are used to define a sequence of primitives

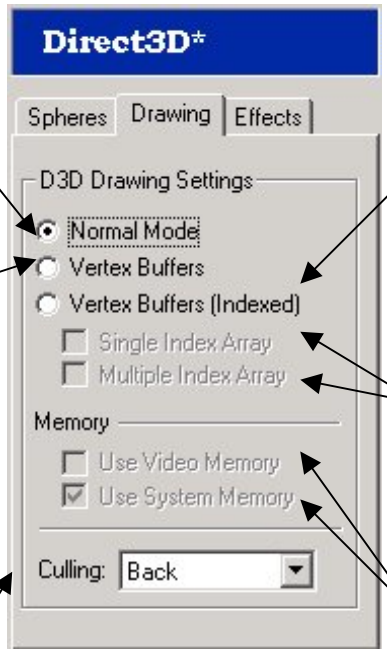
Vertex Array Primitives
The primitives and procedures used in vertex array mode are defined in section 3.5 (Table 3.0)

4.5: Drawing Settings Tab – Direct3D

Normal Mode
Uses the D3D DrawPrimitive * method to render the spheres. This is the default drawing mode for the Direct3D version. Also, note that Normal Mode requires system memory.

Vertex Buffers
The vertex buffers can be created using system or video memory, however when stressing the AGP bus system memory should always be used. In addition, Normal Mode, although not capable of the polygon rates associated with vertex buffers, has shown to be better at stressing the AGP bus. Uses the D3D DrawPrimitiveVB method to draw the spheres.

Culling Mode
Same as in OpenGL (see Section 2.2)



Vertex Buffers (Indexed)
The indexed vertex buffer is created in a somewhat different manner than an ordinary vertex buffer, although they share similar characteristics. The main difference is an indexed vertex buffer uses an auxiliary array that indexes into the polygon data in the vertex buffer and allows D3D to step through it in a non-sequential manner. This mode uses the D3D DrawIndexedPrimitiveVB method.

Single/Multiple Index Array
The Single Index Array uses only one array to index the vertex buffer. In contrast, the Multiple Index Array always uses more than one.

Memory
Vertex buffers can be allocated in system memory or in video memory. Although allocating memory locally on the video card drastically improves performance, it does *not* stress the AGP bus. Therefore, if Vertex Buffers are on, System Memory should always be used.

4.6: Effects Settings Tab

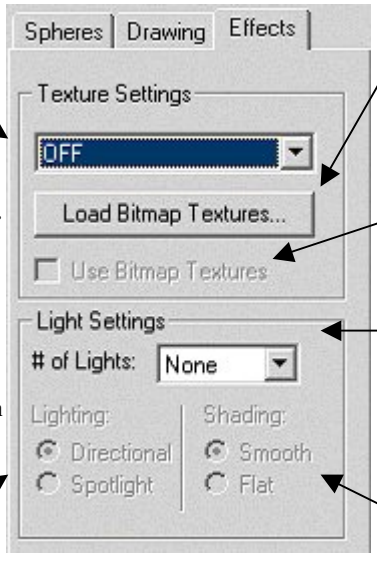
Texture Settings
Default*: uses predefined texture coordinates to graph the texture to the object (sphere). This is the fastest texture-mapping mode.

Sphere Map: wraps the texture around the object according to viewing position.

Eye Linear and Object Linear: see the MSDN library under glTexGenf for details

*The default texture setting is not implemented in

Lighting (Types)
There are two types of lighting: Directional and Spotlight. Directional requires less computation and therefore, is faster. Lighting should not be enabled when stress testing the AGP bus.



Load Bitmap Textures
Opens a window to load bitmap textures.

Use Bitmap Textures
When enabled the textures loaded into memory will be applied to the spheres. When stress testing the AGP bus, bitmap textures should be off. This setting is not yet implemented in Direct3D

Number of Lights
Can be set to [0,4]. Each light is predefined and static in position. Lighting should always be turned off when stressing testing the AGP bus.

Shading
Specify the shading technique used. The default OpenGL and Direct3D implementation is "Smooth". Shading is only relevant when lights are on. This setting does not effect stress testing

Chapter 5: Logging

Logging is an important feature of the AGP Stress Agent; without it, pinpointing a problem caused by AGP, OpenGL, or Direct3D API would be rather difficult. This section walks through the four log modes as well as the log properties dialog that can be accessed through the main menu (see figure on the right).

5.1: The Four Logging Modes

The Intel® AGP Stress Agent has four different levels of logging intensity: *Off*, *Default*, *Medium*, and *High*, which can be set in the log menu or the log properties dialog. The application logs different amounts of information depending on the log level.

Log Off
This log level is the ideal setting when stressing the AGP bus because it prevents the log from adding further processor overhead. With the log set to off, only severe errors will be logged.

Log Default
Only initialization information and severe errors are logged. This log level should produce little overhead on the system. During stress testing, it is suggested to use the default or off log levels.

Log Medium
In addition to the default level functionality, the medium log level outputs OpenGL/Direct3D state change information. This could be helpful in determining if a certain OpenGL/Direct3D setting is causing problems.

Log High
This log level will induce the most overhead on the system and should only be used for debugging purposes. Make sure the log is set to off when attempting to maximize the bandwidth over the AGP bus.

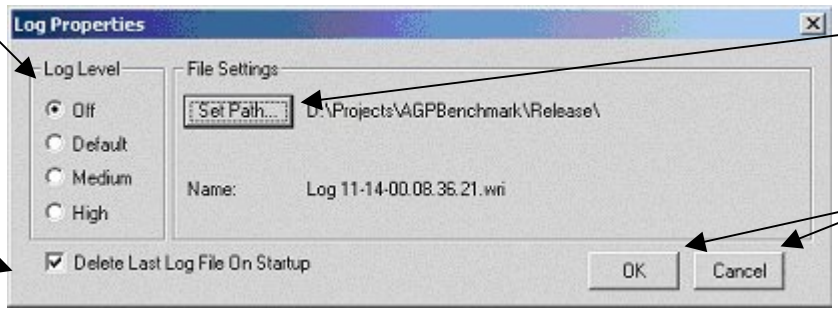
If, during stress testing, the AGP Stress Application ceases to function or the system crashes, reboot the computer and restart the application with the logging intensity set to Medium or High. Then, revert to the same settings that caused the problem and run the stress test again. If the problem reoccurs, the log will contain information that will be useful in determining the root cause.

5.2: The Log Properties Dialog

The log properties dialog, which can be accessed through the main menu under Log->Properties, allows the user to control the log level, file settings, and whether or not to delete the last log file upon execution of the application.

Log Level
Set one of the four log levels; see Section 3.0.

Delete Last Log
This setting allows the application to delete the preceding log file while the application starts up. The hard drive will begin accumulating log files if this setting is turned off.



Set Path
Set the log file path and name here.

OK/Cancel
Clicking OK will apply the settings, clicking cancel will not

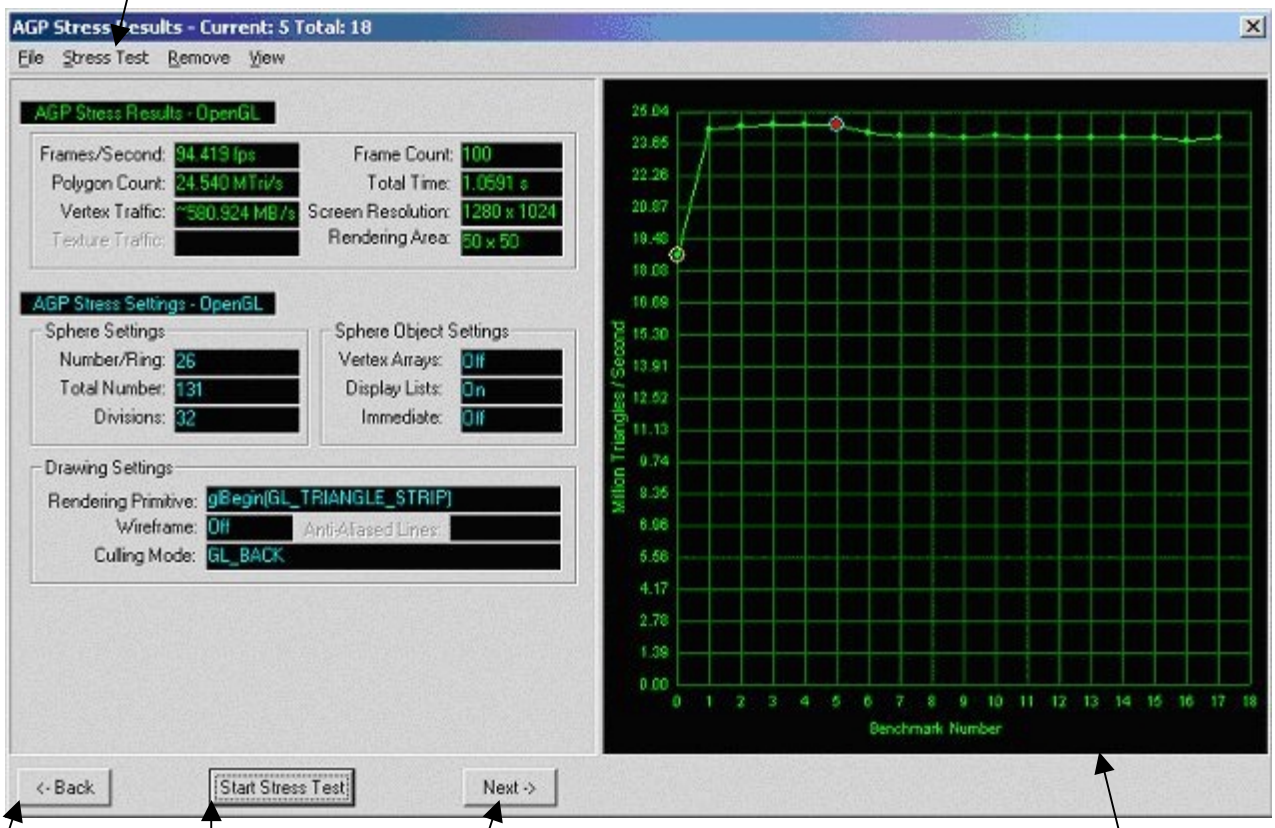
Chapter 6: AGP Stress Testing

Although the Intel® AGP Stress Agent contains a great number of settings and commands, the user can be, for the most part, unaware of this functionality and still operate the application correctly. However, because Chapter 4 primarily covers the stress tests themselves, it is important to have at least a basic understanding of this chapter.

6.1: The AGP Stress Test Window

The AGP Stress Test Window, shown below, provides an interface to the stress test settings and results.

Stress Test Menu
Refer to Section 4.1

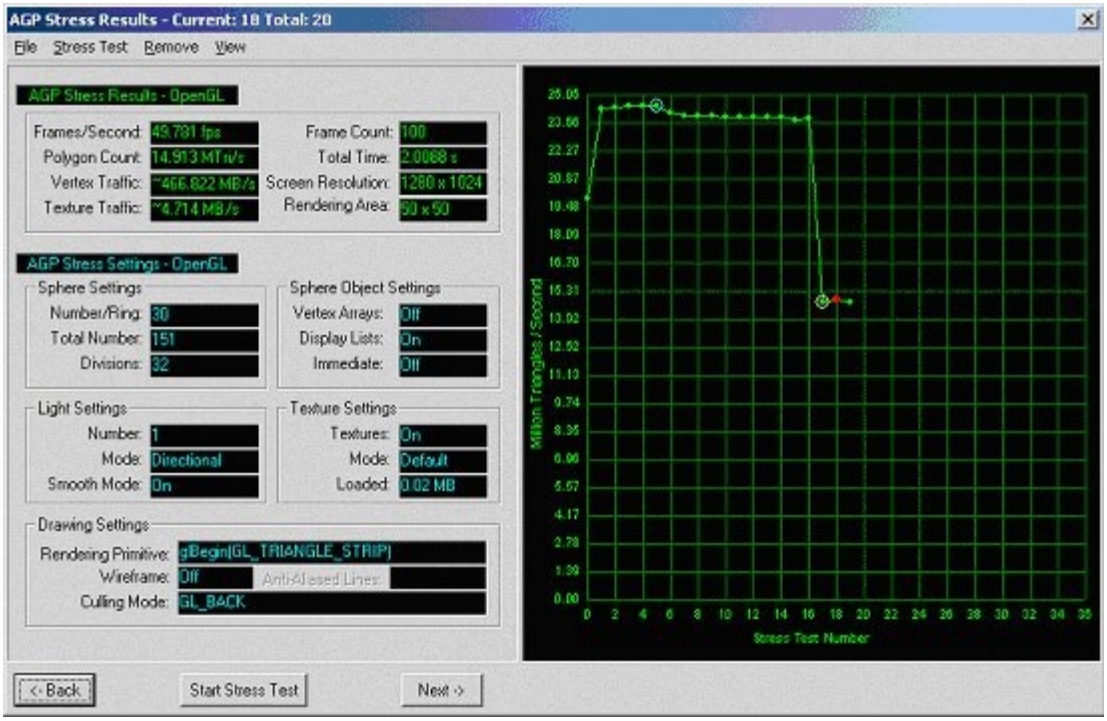


As can be observed from the figure above, the AGP Stress Results window is divided into two parts: the results display and the results graph. The results display, located in the left half of the window, can be switched from the default view to a text view format that may be easier to read for some users. The results graph is located in the right half of the window and charts the stress test number vs. polygon count. Section 4.2 and 4.3 describe (in more detail) the results display and graph.

6.2: AGP Stress Results Explained

The AGP Stress Test Results can be displayed using two distinct methods, which are described below.

Default Display



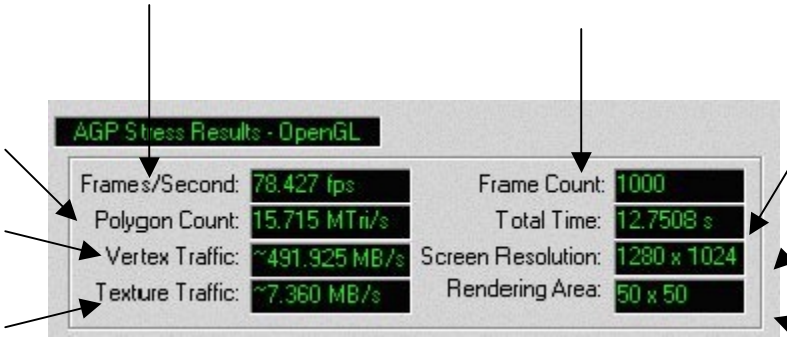
The default display mode shows the results data in green and the settings data in blue. The format of the results data (shown below) is the same for both OpenGL and Direct3D.

Frames Per Second
Displays the number of frames drawn per second

Frames Count
The total number of frames rendered during the benchmark

Polygon Count
Displays the number of triangles drawn per second

Total Time
The total time it took to run the benchmark



Vertex Traffic
The amount of vertex (and normal) data processed / second

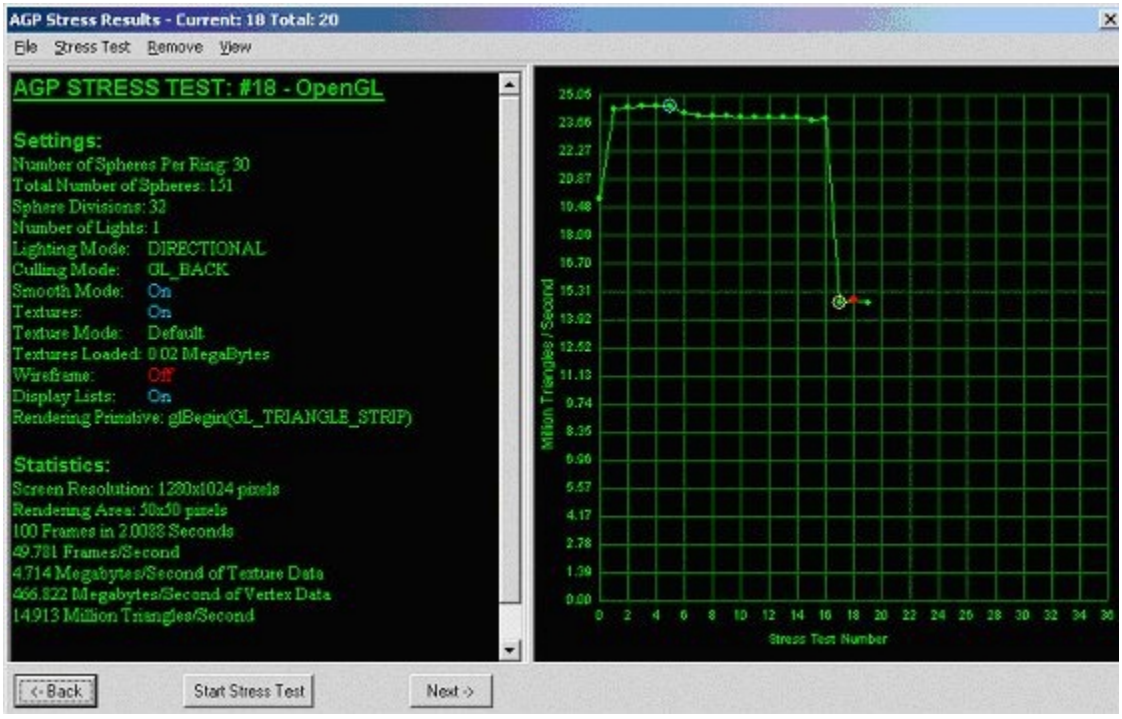
Screen Resolution
The screen resolution during the benchmark

Texture Traffic
The amount of texture data processed/second

Rendering Area
The view port area rendered to by OpenGL/Direct3D

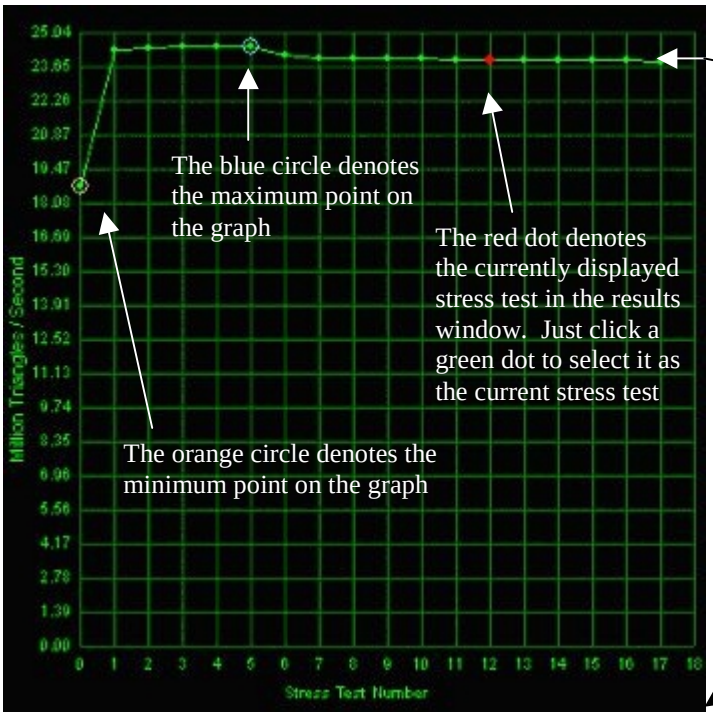
Text Display

The text display mode can be selected through the *View* menu (see Section 6.3). Although this display mode looks different than the default display mode, both output the same data.



Graph Display

The graph display charts the polygon rate for each stress test. Left clicking on a point will select the associated stress test in the results view. Pressing the right click button and selecting remove will delete the selected point and remove the stress test. Note also that the maximum point is highlighted in blue and the minimum point is highlighted in orange.



Right Click
Right click to show a pop-up menu. *Remove* will delete the selected, red, dot.

Y-axis label
Million Triangles / Second

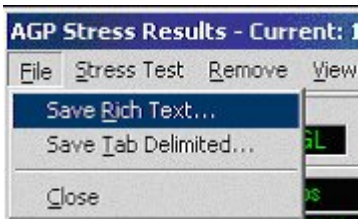
X-axis label
Stress Test Number

6.3: The AGP Stress Test Menu

The AGP Stress Test Window contains four items: File, Stress Test, Remove, and View.

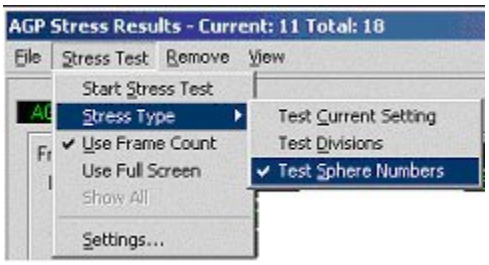
File

The *File* menu (shown right) allows the user to save the current stress tests to a file. *Save Rich Text* can save the stress tests in a rich text format, Microsoft Word document, or a simple text format. *Save CSV Text* saves the data into a CSV format that can be loaded into excel (see Section 2.7).



Stress Test

The *Stress Test* menu (shown right) allows the user to select settings relevant to the stress test.



Start Stress Test

The stress test can be initiated by selecting this menu item or the *Start Stress Test* button located in the bottom left section of the window.

Stress Type

This menu item contains three sub-menu items that describe different stress testing modes. *Test Current Setting* will run a stress test on the current settings only. *Test Divisions* and *Test Sphere Numbers* will run a stress test changing the amount of divisions or spheres over time, but keeping the other settings constant. For each iteration, the stress test will run until a frame limit is hit and then increment the amount of divisions or spheres (according to the *Step* variable set in the *Settings* dialog) until the maximum sphere or division value is reached.

Test Divisions and *Test Sphere Numbers* will be disabled if *Use Frame Count* is off.

Use Frame Count

The stress test will halt when a certain frame number has been exceeded, otherwise the stress test will wait for the escape key to be pressed. If the frame count is used, it is recommended that it be set to a relatively high figure.

Use Full Screen

This setting denotes whether or not to use full screen during the stress test. It is recommended that full screen mode be turned off during stress testing and the drawing area be set to a minimum (see Section 2.2 and 4.3)

Show All

This setting is only enabled in text window mode. When enabled, all stress tests will be output onto the rich text window.

Settings

This menu item will open the AGP Stress Settings dialog (see Section 6.4)

Remove

The *Remove* menu contains two items, both of which refer to removing, or deleting, stress tests. *Remove Selected* will remove the currently displayed stress test and *Remove All* will remove every stress test. Note that right clicking within the results/graph area can also access this menu.

View

The *View* menu allows the user to change how the stress test data is displayed in the AGP Stress Results window. The default window displays the data using formatted edit boxes while the text window simply outputs the results in a text window. See Section 4.3 for more information

6.4: The AGP Stress Test Settings Dialog

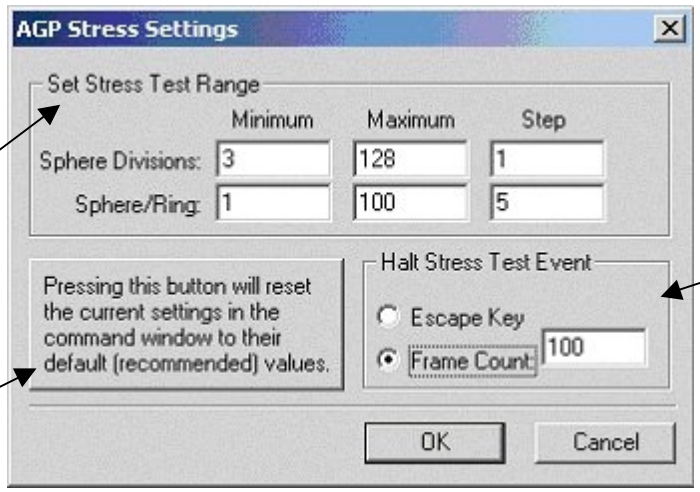
The AGP Stress Test Settings Dialog can be used to set variables associated with the stress test.

Set Stress Test Range

When the *Test Divisions or Test Sphere Numbers* stress tests are selected, these values are used to calculate the starting and ending point as well as the step increment.

Reset to Optimal Settings

This button will restore the settings in the command window for OpenGL / Direct3D API



Halt Stress Test Event

The stress test can be halted by one of two events, either the user presses the escape key or a frame limit is hit. When *Frame Count* is selected, the user can still exit the stress test by the escape key – but this will obviously effect the results.